

Scale:

Quiz B for 9:45 Class: 08/09/13

Name Key

Your firm is considering investing \$30 million in a new facility to produce Wi-Fi phones. This new facility would roughly double the size of your firm since you currently have assets with a market value of \$25 million. Your firm expects the facility to produce its first net, after-tax annual cash flow of \$6 million one year from today. Subsequent annual after-tax cash flows would grow by 1% per year through 10 years from today. The standard deviation of returns on the new facility would equal 25% over the next three years and 20% thereafter. This is higher than the standard deviation of returns on your firm's existing assets: 21% over the next two years and 15% thereafter. If sales exceed expectations, the facility can be expanded three years from today for \$15 million. This expansion would generate expected cash flows of \$3 million per year for 7 years. The standard deviation of returns on this expansion equals 28%. The risk-free interest rate varies by maturity as follows: 1 - year = 1%, 2 - year = 1.9%, 3 - year = 2.1%, 4 - year = 2.4%, 5 - year = 2.5%, 6 - year = 2.6%; 7 - year = 2.7%, 10 - year = 2.8%.

Set up the calculations needed to determine whether the facility should be built if the cost of capital for the facility equals 12% per year and on the expansion equals 14% per year. You do not need to solve anything.

$$NPV = -30 + \underbrace{\left(\frac{6^{+3}}{.12 - .01^{+3}} \right)}_{+4} \left(1 - \left(\frac{1.01^{+10}}{1.12^{+3}} \right) \right) + C \quad (19)$$

$$+4 \quad C = S(N(d_1)) - PV(K)(N(d_2)) \quad (4)$$

$$+3 \quad d_1 = \frac{\ln\left(\frac{S}{PV(K)}\right)}{.28\sqrt{3}} + \frac{.15^{+5} \sqrt{3}}{2} \quad (13)$$

$$+3 \quad d_2 = d_1 - .28\sqrt{3} \quad (3)$$

$$+4 \quad S = \left(\frac{3^{+3}}{.14^{+3}} \right) \left(1 - \left(\frac{1}{1.14} \right)^7 \right) \left(\frac{1}{1.14} \right)^3$$

$$+3 \quad PV(K) = \frac{15^{+5}}{(1.021)^{+5}} \quad (18)$$

+1 \Rightarrow look up $N(d_1)$ & $N(d_2)$ on tables or w/ Excel

75=75
73=74
72=74
67=71
61=68
58=67
53=64
52=64
45=60
42=59
41=58
39=57
33=54
26=51
19=47
16=46
10=43
9=42